CLAIMS

1. An blending method comprising:

providing a set of examples that pertain to a shape or motion that is to be animated, the examples being provided relative to a multi-dimensional abstract space;

selecting a point within the multi-dimensional abstract space that does not coincide with a point that is associated with any of the examples, the selected point corresponding to a shape or motion within the abstract space;

computing a single weight value for each of the examples; and

combining the single weight values for each of the examples in a manner that defines an interpolated shape or motion that is a blended combination of each of the examples of the set of examples.

2. The blending method of claim 1, wherein said selecting is performed by an application.

3. The blending method of claim 1, wherein said selecting is performed by a game application.

4. The blending method of claim 1, wherein said selecting is performed at run time.

5. The blending method of claim 1, wherein said computing is performed at run time.

6. The blending method of claim 1, wherein said computing and combining are performed at run time.

7. The blending method of claim 1, wherein said computing comprises:

defining a cardinal basis for each example; and

evaluating the cardinal basis for each example relative to the selected point to provide the weight value.

8. The blending method of claim 7, wherein the cardinal basis comprises:

a radial basis function portion; and

another portion that is different from the radial basis function portion.

9. The blending method of claim 8, wherein said another portion is not a radial basis function portion.

10. The blending method of claim 8, wherein said another portion is a linear portion.

11. One or more computer-readable media having computer-readable instructions thereon which, when executed by a computer, implement the method of claim 1.

12. A computerized blending system that is programmed with instructions which, when executed by the system, implement the method of claim 1.

13. An blending method comprising:

linearly approximating a degree of freedom that is associated with a new form or motion that is to be rendered based upon a plurality of examples that define respective forms or motions within an abstract space;

defining a radial basis function for each of the examples;

combining the linear approximation and the radial basis functions to provide a cardinal basis function; and

using the cardinal basis function to render the new form or motion.

14. The blending method of claim 13, wherein:

said acts of linearly approximating and said defining are performed for each example; and

said combining comprises combining each of the respective linear approximations and their associated radial basis functions to provide multiple cardinal basis functions, one for each example; and

said using comprises combining the multiple cardinal basis functions to define a function that describes the new form or shape within the abstract space.

15. The blending method of claim 13, wherein said defining comprises scaling the radial basis function for each example.

16. The blending method of claim 15, wherein said scaling comprises evaluating a matrix system to ascertain a plurality of scaling weights, individual weights of which are used to scale the radial basis functions.

17. The blending method of claim 16, wherein said matrix system is configured so that its evaluation yields scaling weights which, when used to scale a corresponding radial basis functions, result in a combination of the radial basis functions and the linear approximation to provide the cardinal basis function.

18. The blending method of claim 13, wherein the radial basis functions are selected from a b-spline family of radial basis functions.

19. The blending method of claim 13, wherein said linearly approximating comprises approximating the degree of freedom with a least squares linear approximation.

20. One or more computer-readable media having computer-readable instructions thereon which, when executed by a computer, implement the method of claim 13.

21. A computerized blending system that is programmed with instructions which, when executed by the system, implement the method of claim 13.

22. One or more computer-readable media having computer-readable instructions thereon which, when executed by a computer, cause the computer to:

linearly approximate a degree of freedom that is associated with a new form or motion that is to be rendered based upon a plurality of examples that define respective forms or motions within an abstract space, by deriving basis hyperplanes that fit a least squares hyperplane to a case where one example has a value of 1 and the remaining examples have values of 0;

account for residuals between the example values and the hyperplane by:

associating a radial basis function with each example;

ascertaining a radial basis weight value for each radial basis function; and

scaling each radial basis function by its ascertained radial basis weight value; and

sum the linear approximation and scaled radial basis functions to provide a cardinal basis function.

23. The computer-readable media of claim 22, wherein the instructions cause the computer to perform the recited acts of linear approximation, accounting, and summing for each example to provide multiple cardinal basis functions.

24. The computer-readable media of claim 23, wherein the instructions further cause the computer to sum the multiple cardinal basis functions to provide a function that describes the new form or motion within the abstract space.

25. The computer-readable media of claim 24, wherein the instructions cause the computer to select a point on the defined function and render a new form or motion.

26. The computer-readable media of claim 22, wherein each radial basis function has a width that is a function of the distance between its associated example and the next nearest example in abstract space.

27. The computer-readable media of claim 22, wherein each radial basis function is selected from the b-spline family of radial basis functions.

28. A computerized blending system comprising:

at least one computer-readable media;

at least one processor;

instructions resident on the computer-readable media which, when executed by the processor, cause the blending system to:

linearly approximate a degree of freedom that is associated with a new form or motion that is to be rendered based upon a plurality of examples that define respective forms or motions within an abstract space, by deriving basis hyperplanes that fit a least squares hyperplane to a case where one example has a value of 1 and the remaining examples have values of 0;

account for residuals between the example values and the hyperplane by:

associating a radial basis function with each example;

ascertaining a radial basis weight value for each radial basis function; and

scaling each radial basis function by its ascertained radial basis weight value; and

sum the linear approximation and scaled radial basis functions to provide a cardinal basis function.

29. The computerized blending system of claim 28, wherein the instructions cause the blending system to perform the recited acts of linear approximation, accounting, and summing for each example to provide multiple cardinal basis functions.

30. The computerized blending system of claim 29, wherein the instructions further cause the blending system to sum the cardinal basis functions to provide a function that describes the new form or motion within the abstract space.

31. The computerized blending system of claim 30, wherein the instructions cause the blending system to select a point on the defined function and render a new form or motion.

32. The computerized blending system of claim 28, wherein each radial basis function has a width that is a function of the distance between its associated example and the next nearest example in abstract space.

33. The computerized blending system of claim 28, wherein each radial basis function is selected from the b-spline family of radial basis functions.

34. An blending method comprising:

defining a set of examples that pertain to a form or motion that is to be animated, the examples being provided relative to a multi-dimensional abstract space;

examining a plurality of forms or motions that are animated within the abstract space from the defined set of examples;

identifying at least one form or motion that is undesirable;

selecting a form or motion from a location within the abstract space that is proximate a location that corresponds to the undesirable form or motion; and

replacing the undesirable form or motion with the selected form or motion to provide a pseudo-example that constitutes a linear sum of the examples of the set of examples.

35. The blending method of claim 34 further comprising, prior to said examining, providing the plurality of forms or motions by, for each form or motion:

linearly approximating a degree of freedom that is associated with a new form or motion that is to be rendered based upon the set of examples;

defining a radial basis function for each of the examples;

combining the linear approximation and the radial basis functions to provide a cardinal basis function; and

using the cardinal basis function to render the new form or motion.

36. The blending method of claim 35, wherein:

said acts of linearly approximating and said defining are performed for each example; and

said combining comprises combining each of the respective linear approximations and their associated radial basis functions to provide multiple cardinal basis functions, one for each example; and

said using comprises combining the multiple cardinal basis functions to define a function that describes the new form or shape within the abstract space.

37. The blending method of claim 36, wherein the radial basis functions are selected from a b-spline family of radial basis functions.

38. The blending method of claim 37 further comprising, after said replacing producing a plurality of new forms or motions by repeating said acts of linearly approximating a degree of freedom, defining a radial basis function, combining and using, the pseudo-examples influencing the shape of the cardinal basis functions.

39. An blending method comprising:

defining at least two examples of a form, a first of the example forms being defined in a first position and a second of the example forms being defined in a second position that is different from the first position; and

computing a form in the first position such that when the computed form is subjected to a transform blending operation that places the computed form in the second position, it will match the second example form.

40. The blending method of claim 39, wherein the first position is a rest position.

41. The blending method of claim 39, wherein the first position is a rest position and the second position is angularly displaced from the first position.

42. The blending method of claim 39, wherein said computing comprises computing a plurality of vertices associated with the form.

43. The blending method of claim 42 further comprising, after computing the plurality of vertices, geometrically blending the computed form in the first position with the first example form in the first position to provide a geometrically blended form in the first position.

44. The blending method of claim 43 further comprising after said geometrically blending, transform blending the geometrically blended form to provide the form that matches the second example form.

45. The blending method of claim 39, wherein the example forms pertain to a skeleton-based figure.

46. One of more computer-readable media having computer-readable instructions thereon which, when executed by a computer, cause the computer to:

define at least two examples of a form, a first of the example forms being defined in a first position and a second of the example forms being defined in a second position that is different from the first position; and

compute a form in the first position such that when the computed form is subjected to a transform blending operation that places the computed form in the second position, it will match the second example form.